

REMARKS

Applicants respectfully request reconsideration of the pending claims. In that regard, note the advantages of the apparatus discussed with regard, for example, to Figures 1 through 4b. As described in the background section, conventional electrodialysis techniques are impractical for the analysis of trace metals because the resulting hydroxide ions react with the trace metals to form precipitates of metal hydroxides. In contrast, Applicant has disclosed methods and apparatus that neutralize the acidic matrix while preventing the formation of these precipitates.

An embodiment of this technique is illustrated in Figure 4b. At the anode, there is a first carrier solution channel (303) which is separated by a sample channel (305) from a second carrier solution channel 307 at the cathode. When an electric field is applied across the anode and cathode, sulfate from the acidic matrix (sulfuric acid) in the sample diffuses across a first anion exchange membrane (304) into the first carrier solution channel. To keep electric neutrality in the sample, hydroxide from the second carrier solution diffuses across a second anion exchange membrane into the sample. The hydroxide combines with the protons from the sulfuric acid matrix to form water. But note that a metal-complexing reagent also diffuses from at least the second carrier solution into the sample. For example, acetic acid may be used as the metal-complexing reagent. Acetic acid is relatively weak and thus will exist in neutral form in the second carrier solution. Such a neutral form will diffuse across the anion exchange membrane into the sample where it will deprotonate in the presence of hydroxide to form water and acetate. This acetate complexes with the trace metal(s) in solution to prevent them from reacting with any stray hydroxide ions. In this fashion, the acidic matrix is eliminated yet the trace metal(s) are stabilized for later analysis.

Claim 1 is directed to such advantageous subject matter. For example, claim 1 recites the acts of "flowing a first carrier solution through the first carrier solution channel; flowing a second carrier solution including a metal-complexing reagent through the second carrier solution channel so that the metal-complexing reagent diffuses through the second ion exchange membrane into the sample; and providing an electrical potential to assist diffusion of an anionic form of the acidic matrix through the first anion exchange membrane into the first carrier solution channel and to assist diffusion of hydroxide ions

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from the second carrier solution through the second anion exchange membrane into the sample to neutralize at least a portion of the acidic matrix, whereby the diffused metal-complexing reagent in the sample complexes with the at least one trace metal such that the at least one trace metal doesn't combine with the hydroxide ions." No new matter is added, the support being as set forth above.

The cited prior art stands in sharp contrast. In particular, the Petty reference (USP 6,296,760) uses a membrane including polymers that are "virtually non-permeable to charged or polar species." (Col. 4, lines 46-47). As such the membrane in Petty is the antithesis of an ion exchange membrane, let alone an anion exchange membrane as recited in claim 1. Moreover, there is no electric field in Petty to bias the anion exchange membranes as set forth in claim 1. The Dasgupta publication (2005/0202563) adds nothing further as there Dasgupta merely uses a single ion exchange membrane to separate aqueous and organic solutions as seen in Figure 9a. In sharp contrast, claim 1 recites two anion exchange membranes that are biased such that "to assist diffusion of an anionic form of the acidic matrix through the first anion exchange membrane into the first carrier solution channel and to assist diffusion of hydroxide ions from the second carrier solution through the second anion exchange membrane into the sample to neutralize at least a portion of the acidic matrix" The Stillian reference (USP 5,518,622) is also inapposite as it teaching the electrodialysis of a NaOH sample as seen in Figure 4. The ion exchange membranes are plainly cation exchange membranes as seen by the flow of protons from channel 49 across membrane 36 and by the flow of sodium ions across membrane 34. There is not a hint of a suggestion in Stillian to provide an electrodialysis device for the elimination of acidic (rather than basic) matrices. Moreover, there is no suggestion or teaching in Stillian for the provision of a metal-complexing reagent. Finally, the Hase reference (6,030,844) adds nothing further to Stillian – as seen in the abstract of Hase, Hase is also dedicated to the elimination of a basic matrix (in this case, a "volatile alkali").

In any case, Applicants respectfully point out that they are not merely claiming "electrodialysis" or "ion exchange" – those concepts being plainly old as shown by the cited prior art. In sharp contrast, Applicants have set forth specific limitations in claim 1 that are neither suggested nor taught by the cited prior art.

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Accordingly, claim 1 and its dependent claims are allowable over the cited prior art.

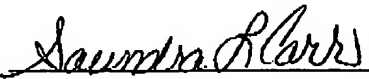
Claim 8 has been amended analogously as discussed with regard to claim 1 in that it now includes the act of "providing an electrical potential between the carrier solution channels to assist diffusion of an anionic form of the acidic matrix through a first one of the anion exchange membranes and to assist diffusion of hydroxide ions through a remaining one of the anion exchange membranes into the sample to neutralize at least a portion of the acidic matrix". Claim 8 and its dependent claims are thus allowable analogously as discussed with regard to claim 1.

Similarly, claim 24 has been amended analogously as discussed with regard to claim 8 such that claim 24 and its dependent claim are thus allowable analogously as discussed with regard to claim 1.

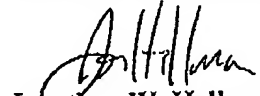
If the Examiner has any questions or concerns, a telephone call to the undersigned at (949) 752-7040 is welcomed and encouraged.

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 May 16, 2006
Sandra L. Carr Date of Signature

Respectfully submitted,


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